FarmFacts

Produced by Saskatchewan Agriculture and Food and Saskatchewan Rural Development

Biological Control of Leafy Spurge

The Problem

In Saskatchewan leafy spurge (Euphorbia esula virgata complex) infests approximately 20,000 acres of pasture and native prairie in a diagonal belt from North Battleford to Estevan.

Leafy spurge is a perennial weed which reproduces by seed and vegetative root buds. The dense stands of the leafy spurge take over the grasses in the pasture.

Cattle generally avoid grazing in areas where spurge is present because it causes scours and mouth blistering.

Chemical Control

Spurge can be controlled with Tordon 22-K. Application of Tordon is necessary every four years.

Control can also be achieved with annual applications of 2,4-D and cultivation, however, it is generally not a problem on cultivated lands.

Biological control

Biological control of a weed involves the use of parasites, predators and pathogens. The biological control of leafy spurge which was brought over to Canada from Eastern Europe in the 1800's involved a number of steps:

1. Searching areas of Europe with climates similar to the Canadian prairies for spurge insects;
2. Feeding studies to ensure that selected organisms will not attack desirable plants;
3. Establish experimental colonies to determine requirements and impacts;
4. Establish regional colonies as public distribution centers;
5. Distribute the successful organisms to suitable spurge sites with the assistance of the public.

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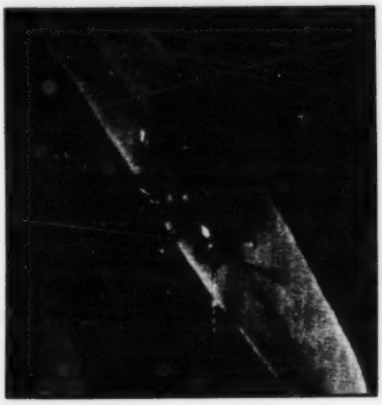


The Biocontrol Agents

Two beetles were selected from Eastern Europe for the biocontrol of leafy spurge. The black dot spurge flea beetle (**Aphthona nigriscutis**) has established well on hot dry sites where the spurge suffers drought stress in late July and August. Good sites are typically on coarse soils and at the top of south facing slopes or on knolls. The presence of a bunch grass such as thread needle grass (**Stipa comata**) is an indicator of a good site.

The brown dot spurge flea beetle (**Aphthona cyparissiae**) requires a moister habitat than the Steppe spurge flea beetle. Good sites are found on the bottom third of valley slopes and in slightly depressed areas. In the absence of spurge these sites are covered with a grass sod. In these sites lateral growth occurs on the spurge stems in late July and August.

The Life Cycle

Both beetles have similar life cycles. The adult beetles emerge in late June or early July and feed near the top of the shoot and at the leaf edges. The beetles mate and the females lay their eggs in groups of 20-30 below the soil surface near a spurge root. Females lay through the summer producing up to 300 eggs per season. The Cypress spurge flea beetle has a longer oviposition period than the Steppe spurge flea beetle and may continue to lay eggs until freeze up.

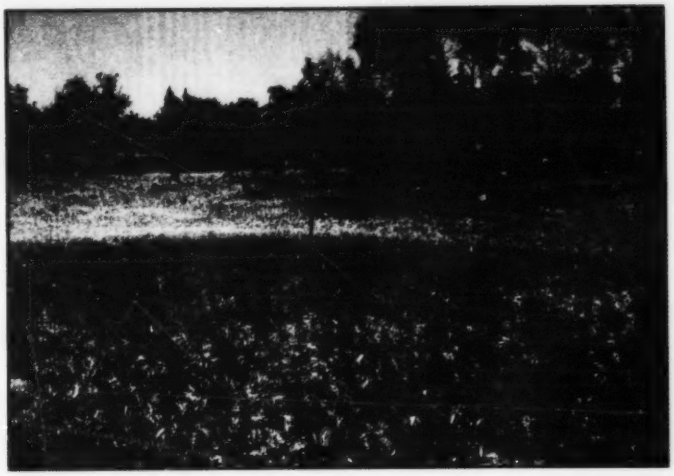
The eggs hatch in about three weeks and the larvae burrow through the soil until they encounter a small root which they mine. As the larvae grow in size they feed on the larger perennial roots of the spurge. Development to the third and final instar takes about two months. Feeding then ceases and the larvae construct an overwintering cell in the soil and become dormant. In the spring the larvae resume feeding for about three weeks, pupate in the soil and then emerge as adults.

The Impact of Biocontrol

Although the adult beetles feed on the spurge leaves it is the larvae that are primarily responsible for the biological control of the plant. The larvae attack the plant by destroying the root system. The plant's nutrient reserves become depleted, the plant is no longer able to flower and eventually will wither and die.For example, at the main research site the Steppe spurge flea beetle has decreased dry spurge biomass from 63 g/ m^2 to 4 g/m^2. The spurge is still decreasing.

The success of a beetle colony and its impact on the site can be gauged using a number of criteria. Optimal sites, where there is good beetle establishment, will have the following characteristics in common:

- A count of over 25 beetles per 5 sweeps after one year (a sweep net is used to collect beetles to determine beetle density);
- A noticeable reduction of flowering spurge after two years;
- A temporary increase in the number of non-flowering stems, which may persist for four years;
- A reduction in the dry weight of spurge and an increase in the dry weight of grasses and other herbaceous species;
- The presence of beetles in a five pace radius from the release point after one year. It is possible to monitor this progress for four to five years after which the colony becomes so large that it is difficult to establish boundaries.



Beetle colonies that are optimal should be ready for harvest after three full years.

The target for the biocontrol of spurge is to reduce spurge to a maximum of 5% cover. Field work has demonstrated that this target can usually be achieved, in the release area, within five years.

The biocontrol of leafy spurge demonstration project is funded by the **Saskatchewan Agriculture Development Fund** in cooperation with the Saskatchewan Association of Rural Municipalities, Agriculture Canada and Saskatchewan Agriculture and Food.